

The Canadian Entomologist.

VOL. L.

LONDON, OCTOBER, 1918

No. 10

POPULAR AND PRACTICAL ENTOMOLOGY.

THE FRUIT-TREE LEAF-ROLLER (*TORTRIX ARGYROSPILA*).

BY L. CAESAR, GUELPH, ONT.

It is only during the last five or six years that the Fruit-tree Leaf-roller has been known as a dangerous pest in apple, pear or plum orchards in Ontario. It has evidently, however, been present in the province for many years, for otherwise the writer would not have been able the second year of the outbreak to find it here and there in small numbers in almost every fruit-growing district of the province.

Up to the present time only three bad outbreaks have been discovered, and these all occurred almost simultaneously about six years ago. One of these was in a ten-acre orchard in the county of Northumberland, another in a larger orchard in the county of Wentworth, and the other in a still larger orchard in the county of Norfolk. The history of the insect in each of these three orchards may prove of interest and possibly of some value.

The first two years in all three orchards much damage was done, and the owners estimated that from 20% to 60% of the fruit was ruined. In the third year the insect began to decrease in number in both the Northumberland and Wentworth orchards, and has now almost disappeared from them. In the Norfolk orchard there was also a decrease in the third year and comparatively little injury since until this year, when a large portion of the orchard is once more severely attacked. All surrounding orchards in each of these localities have remained practically free from the pest. This shows clearly its remarkable tendency to localize itself and remain almost exclusively in its chosen abode.

The owners of the respective orchards endeavored on the writer's suggestion to control the insect by very heavy applications of arsenate of lead just before the blossoms opened and again immediately after they fell. After the second season it was seen that arsenicals would not control it, and following the experience

of experimenters in the United States scalecide (a miscible oil) was used both in the Wentworth and Norfolk orchards. Fairly good results were obtained in both orchards, but as this mixture is costly it was used only one season in the Wentworth orchard and two seasons in the Norfolk one. It was then thought that natural agents would probably furnish the work of control and that the insect would gradually disappear. This proved true in the case of the Wentworth orchard just as it had done in the Northumberland, but failed in the Norfolk. It is interesting, therefore, to know that in one locality, even apart from any effective spray, natural foes—parasites, disease and unfavourable weather—were able in a few years to remove or control a very dangerous pest, and that in another district they failed to do so even though aided by an application of one of the most effective sprays known. The explanation probably lies in the fact that there is considerable difference in climate in winter, spring and autumn between Norfolk and Northumberland Counties, and also to a lesser extent between Norfolk and Wentworth Counties. Our studies in Norfolk showed that there were at least two species of dipterous parasites there and four or five species of hymenopterous parasites; so that the persistence of the Leaf-rollers there was not due to the absence of parasites, though cooler weather during the larval stages of the insect may have prevented the parasites from being so active as in the other orchards. This, however, is by no means certain.

Lest fruit growers finding a few rolled leaves with greenish or yellowish green larvæ in them become alarmed and think that they are going to have an attack of this dangerous pest, we may mention that there is another very common Leaf-roller, known as the oblique-banded Leaf-roller which occurs almost every year in small numbers in almost every orchard. The larva of this species is not easily distinguished from its more dangerous relative and, therefore, may easily be mistaken for it. The adult moths, however, are easily distinguished. The proper course in our opinion for fruit growers to pursue is not to worry about the Fruit-tree Leaf-roller until it is known to be present in the orchard and to be doing considerable damage—enough damage to justify special measures. When this state of affairs exists spray the trees very

thoroughly with scalecide or some other good miscible oil a few days before the buds burst. This substance will kill all the eggs that it covers, but to insure that the egg masses are all covered means that the spray must be forced right through the tree to the farthest twigs and branches on the opposite side, otherwise many egg masses situated on the inner side of these twigs and small branches will not be hit. The introduction of the new spray guns makes it a great deal easier to control these insects than it was a few years ago. It should be remembered that each barrel of scalecide should be diluted enough with water to make sixteen barrels of mixture for the orchard, and also that this substance is very effective against San José scale. In nearly every case the scalecide should be used two years in succession to insure full success.

NOTES ON COCCIDÆ II. (HEMIPTERA).

BY G. F. FERRIS, STANFORD UNIVERSITY, CALIFORNIA.

As at present constituted, the genus *Spharococcus* is nothing more than a convenient dumping-place for a considerable number of species that are but little understood—or it were entirely truthful to say not understood at all. The only character that the eighteen or twenty included species are supposed to have in common is that of the absence of hairs on the anal ring. I am informed by Mr. Harold Morrison, who has examined the types of *S. casuarina* Maskell, (the type of the genus), that setæ are present on the anal ring of this species, notwithstanding Maskell's assertion to the contrary. In fact, Mr. Morrison is somewhat inclined to believe that this species is nothing more than a species of *Antonina* and certainly the original description and figures support this conclusion. However that may be, some of the species now referred to this genus indubitably have nothing to do with the genotype and must be placed elsewhere. It is probable that but few of these can be assigned to recognized genera.

I am here naming new genera for three of the species now included in *Spharococcus*. One of these, based upon *S. pulchellus* Maskell, belongs to the group now recognized as the tribe *Asterolecaniini* of the subfamily Dactylopiinæ. The other two, based

upon *S. cupressi* Ehrh. and *S. distichium* (Kuwana), appear to belong to an unnamed group that includes *Kuwanina parvus* (Maskell) also. I consider this group to be equivalent in value to the groups at present recognized as tribes of the subfamily Dactylopiinae. Whatever that value may be is certainly questionable for this subfamily, like the genus *Sphaerococcus*, is a most unnatural and but little understood group that must eventually be disrupted and reorganized. Pending this upheaval I shall not name the group under consideration, but shall merely indicate as many of its characters as appear to be of value. The group may be characterized as follows:

Coccidæ referable to the subfamily Dactylopiinae (of the Fernald Catalogue), that is: without abdominal spiracles; end of the abdomen neither cleft nor pygidiform; without a pair of conspicuous lateral prominences. Distinguishable from the other groups of the subfamily chiefly by negative characters. Without dorsal ostioles or cerarii; anal lobes obsolete; without 8-shaped pores; tubular ducts without a filamentous prolongation but bearing at their inner extremity a more or less definitely multilocular pore; anal ring nearly or quite simple, with from two to six very small setæ; antennæ either well developed or vestigial; legs either entirely lacking or well developed.

Included genera: *Kuwanina* Ckll.; *Ehrhornia* new genus; *Paludicoccus* new genus.

KEY TO INCLUDED GENERA.

1. Adult female with well developed legs and antennæ, the latter 6-segmented.....*Ehrhornia*, n. gen.
 Adult female without legs and with vestigial antennæ, the latter not more than 3-segmented.....2.
2. Adult female with a pair of small, circular cribriform plates on the ventral side of the abdomen.....*Kuwanina* Ckll.
 Adult female without cribriform plates.....*Paludicoccus*, n. gen.

Kuwanina Ckll.

1903. Cockerell, T. D. A., in Fernald, Cat. Coccidæ, p. 101.
 Coccidæ of the type described above. Adult female apodous and with the antennæ reduced to mere unsegmented tubercles.

Ventral side of the abdomen with a pair of small, circular, cribriform plates. Dermal pores quinquelocular, somewhat pentagonal in form. Anal ring appearing on the ventral side in the adult female, small, simple, with six small setæ. First stage larvæ with 3-segmented antennæ.

Type of the genus, *Sphærococcus parvus* Maskell.

Notes.—The original description of this genus consists merely of a quotation from a letter by Cockerell to the effect that, "Kuwana differs from Antonina by the larva having 3 or 4-jointed antennæ." It is rather difficult to understand why the genus was compared with *Antonina* rather than with the type of the genus from which it was removed.

Kuwanina parvus (Maskell).

1897. *Sphærococcus parvus* Maskell, Ent. Mon. Mag., vol. 33, p. 244.

1897. *Sphærococcus parvus* Mask.; Maskell, Trans. N. Zealand Inst., vol. 30, p. 247, pl. 27, figs. 9-11.

1902. *Sphærococcus parvus* Mask.; Kuwana, Proc. Calif. Acad. Sci., ser. 3, vol. 2, p. 56.

1903. *Kuwanina parvus* (Mask.); Ckll., in Fernald, Cat. Coccidæ, p. 121.

1915. *Kuwanina parvus* (Mask.); Green, Ent. Mon. Mag., vol. 51, p. 181, figs.

There is little to add to the description given by Green, other than to note that the pores are borne at the inner end of short ducts and that the derm of the abdomen presents a curiously roughened appearance. I have examined specimens from the material recorded by Kuwana in 1902. Mr. Morrison has sent me sketches made from the type of the species and these leave no doubt as to the correctness of the determination.

Ehrhornia, n. gen.

Coccidæ of the type described above. Adult female with well developed legs and antennæ, the latter 6-segmented. Ventral side of the abdomen without cribriform plates. Dermal pores for the most part circular and without distinct loculi. Anal ring appearing on the ventral side in the adult female, small, simple

and with from two to six small setæ. Larva with 6-segmented antennæ.

Type of the genus; *Sphærococcus cupressi* Ehrh. The genus includes also a second species, herein described as *E. graminis*, n. sp. The genus is named in honour of Mr. E. M. Ehrhorn.

***Ehrhornia cupressi* (Ehrh.)**

1911. *Sphærococcus cupressi* Ehrhorn, Can. Ent., vol 43, p. 277, figs. 3, 3a, b, c.

This species will be redescribed at length in a forthcoming paper by Mr. F. B. Herbert, of the Bureau of Entomology, and I shall merely note that the original description is in error in regard to the statement that the anal ring is hairless. The anal ring has six small setæ.

***Ehrhornia graminis*, n. sp.**

(Fig. 12.)

In life.—Occurring in cracks and beneath scales on the root stock of the host; of a bright yellow colour; surrounded by more or less flocculent secretion.

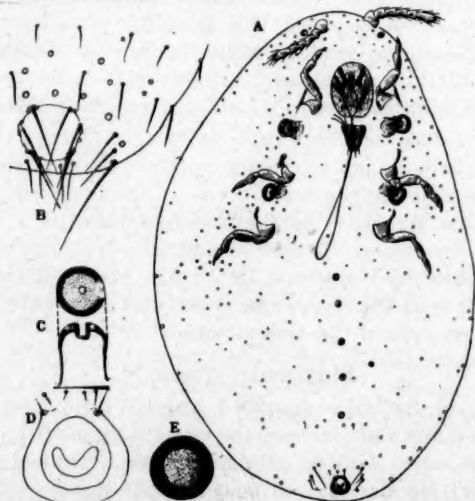


Fig. 12.—*Ehrhornia graminis*, n.sp.: A, female in last instar but not fully grown; B, posterior end of abdomen of first stage larva; C, dermal pore; D, anal ring of adult; E, large pore of the median ventral series.

Morphological characteristics.—Length of largest specimen (flattened on slide) 2.8 mm. Mounted specimens pyriform or circular. Adult female with well developed legs and with 6-segmented antennæ, the last segment longest. Derm membranous throughout except for some irregular chitinization in old individuals. Anal ring (in specimens flattened on the slide) appearing on the ventral side of the body, in old individuals at some distance from the posterior margin, quite small, heavily chitinized, non-cellular, bearing 2 small setæ. Body destitute of all but a very few extremely minute setæ and three slender setæ on each side of the anal ring. Dermal pores quite numerous, all circular, the majority borne at the inner end of short ducts. On the ventral side of the abdomen there is a median, longitudinal row of five quite large, sessile pores.

First stage larva with six-segmented antennæ. Body beset with many slender setæ, especially toward the posterior end. Anal ring simple, bearing six long setæ. Anal lobes lacking. Dermal pores numerous, circular, multilocular or occasionally trilocular.

Type host and locality.—From an undetermined species of perennial grass growing on the ridge about a mile east of the reservoir at Pacific Grove, Monterey County, Calif., Dec. 1, 1917. Collected by the author.

Paludicoccus, n. gen.

Coccidæ of the type described above. Adult female apodous and with the antennæ reduced to mere stubs, three-segmented. Ventral side of the abdomen without cribriform plates. Anal ring quite heavily chitinized, normally with 6 small setæ. Dermal pores circular and without distinct loculi. First stage larva with 6-segmented antennæ. Adult male apterous; antennæ 8-segmented.

Type of the genus; *Sphærococcus disticlum* (Kuwana).

Paludicoccus disticlum (Kuwana).

1902. *Pseudolecanium disticlum* Kuwana, Ent. News, vol. 13, p. 134, figs. 1, 2.

1903. *Sphærococcus disticlum* (Kuw.); Fernald, Cat. Coccidæ, p. 85.

The descriptions and figures given by Kuwana are in general

quite satisfactory, but there remain certain very important details that were overlooked.

The anal ring is not hairless, as was stated in the description, but bears six very small setæ. Due to the heavy chitination of the body these are usually somewhat difficult to see. The antennæ are 3-segmented. The

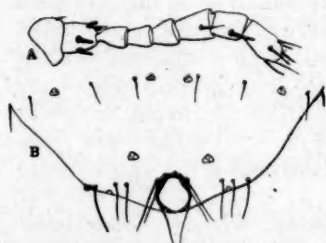


Fig. 13.—*Paludicoccus distictium* (Kuwana): A, antennae of adult male; B, posterior end of abdomen of first stage larva.

dermal pores are in part trilocular but the majority are circular. The circular pores are in part multilocular and sessile and in part without distinct loculi, those of the latter type being borne at the end of short ducts.

In the first stage larva the anal ring bears six slender hairs, not "four spiny hairs." The second stage differs from the adult only in the membranous condition of the derm and the smaller spiracles.

The adult male is apterous. The antennæ are 8-segmented and somewhat clavate. The body is entirely destitute of hairs except for a group of three long setæ on each side at the posterior end of the abdomen. The eyes each consist of a dorsal and a ventral ocellus, the former the larger.

Material examined.—Type and topotype specimens.

Callococcus, n. gen.

Coccidæ referable to the tribe Asterolecaniini of the subfamily Dactylopiinae (of the Fernald Catalogue). Adult female apodous and with the antennæ reduced to mere chitinated points. Anal lobes lacking. No stigmatic clefts or stigmatic spines. Anal ring extremely obscure—apparently hairless. Pores of the 8-shaped type confined to a longitudinal row which extends along the median line of the dorsum from one end of the body to the other. Derm with many tubular ducts of the type common to the tribe, these especially numerous along the median line of the dorsum.

First stage larva without anal lobes; with the anal ring extremely minute and hairless; 8-shaped pores large, confined to the margin of the body; antennæ 4-segmented.

Type of the genus: *Sphærococcus pulchellus* Maskell.

Notes.—Although this genus appears to be unquestionably Asterolecanine it differs markedly from any other known to me. I can say nothing in regard to its relationship with the other members of the group.

***Callococcus pulchellus* (Maskell).**

1896. *Sphærococcus pulchellus* Maskell. Trans. N. Zealand Inst., vol. 29, p. 324, pl. 21, figs. 10-13.



FIG. 14.—*Callococcus pulchellus* (Maskell): posterior end of abdomen of first stage larva.

The adult female of this species is enclosed in a pretty, waxy covering that has been well described by Maskell.

Morphological characteristics.—

Adult female merely an elongate, oval sac, without appendages of any sort. Anal lobes entirely lacking, their position not indicated by setæ. Anal ring probably very minute and hairless, a

it does not appear even in well stained preparations.

Derm membranes except for a narrow, somewhat irregular, longitudinal, chitinized area extending the full length of the body along the median line of the dorsum. This area appearing only in fully mature individuals. Derm with many rather short, tubular ducts, these especially numerous along the dorsal area just described. Pores of the 8-shaped type extremely minute and inconspicuous, confined to a row which extends along the median line of the dorsum from one end of the body to the other. In the fully mature insect this line of pores is almost entirely obscured by the chitinization of the dorsum.

First stage larva with 4-segmented antennæ. Anal lobes lacking, the posterior end of the abdomen pointed. Anal ring extremely minute, hairless. Derm destitute of hairs and with a single, marginal row of large, 8-shaped pores.

Material examined.—Specimens determined by Froggat as this species and agreeing in all respects with the original description.

Mycetococcus, n. gen.

Coccidæ referable to the tribe Asterolecaniini of the subfamily Dactylopiinæ (of the Fernald Catalogue). Adult female apodous and with the antennæ reduced to mere unsegmented tubercles. Body top-shaped, ending in a pair of prominent lobes, which, together with the last segment of the abdomen, are heavily chitinized.

Type of the genus: *Cerococcus ehrhorni* Ckll. *Cerococcus corticis* Towns. and Ckll., also included.

Notes.—The description here given will doubtless appear extremely short, but the characters enumerated are the only ones that the two species included have in common. Although the two are very similar in general appearance and occur upon hosts of the same genus, I am unable to avoid the conviction that they are not congeneric and perhaps should not even be referred to the same group. It has seemed best, however, to place them together until the value of the characters that seem to separate them has been more fully investigated. These differences will be discussed under the species. Neither of the species can be considered as having anything in common with the genus *Cerococcus* to which they have been referred. The first stage larvæ are very different from those of typical *Cerococcus*, the adults lack the "cauda" between the anal lobes and the cribriform plates of the latter genus while the heavily chitinized anal lobes and terminal segment of the abdomen are quite distinctive.

Mycetococcus ehrhorni (Ckll.).

(Fig. 15 A.)

1895. *Cerococcus ehrhorni* Ckll. *Psyche*, vol. 7, p. 255.

1901. *Cerococcus ehrhorni* Ckll.; Patterson, *Proc. Calif. Acad. Sci.*, ser. 3, vol. 2, p. 387, pl. 22, figs. 1-9.

A sufficiently accurate general description of the insect will be found in the papers of Cockerell and Patterson, but there are certain details that have been overlooked.

The derm in the adult female bears numerous small, 8-shaped pores and a very few, extremely minute and delicate tubular ducts that appear to be of the type common to the Asterolecanine forms.

There are no trilocular pores. The anal ring appears to be very small and is entirely obscured by the heavily chitinized anal lobes.

In the first stage larva the anal ring is extremely small and appears to bear but four very minute setae. The terminal segment is not chitinized. There are marginal and two submedian, longitudinal rows of 8-shaped pores. The antennae are five-segmented.

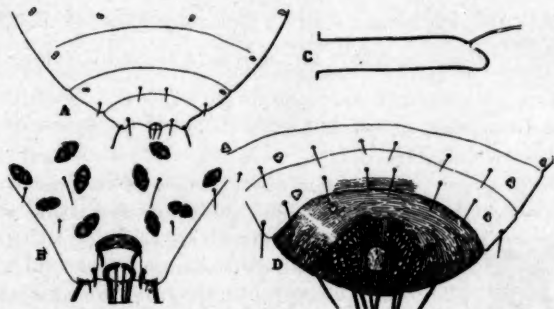


Fig. 15.—A, posterior end of abdomen of first stage larva of *Mycetococcus ehrhorni* (Ckll.); B, posterior end of the abdomen of *Cerococcus bryoides* (Maskell); C, tubular duct of *Mycetococcus corticis* (Townes. & Ckll.); D, posterior end of the first stage larva of *M. corticis*.

Mycetococcus corticis (Townes.).

(Fig. 15 C., 15 D.)

1898. *Cerococcus corticis* Towns. & Ckll., Jn. N.Y. Ent. Soc., vol. 6, p. 170.

1901. *Cerococcus corticis* Towns. & Ckll.; Patterson, Proc. Calif. Acad. Sci., ser. 3, vol. 2, p. 387, pl. 23, figs. 23-28.

As in the case of *M. ehrhorni* there are certain details that former authors have overlooked.

The derm in all stages is entirely destitute of 8-shaped pores. In the adult there are numbers of quite large, tubular ducts of a type quite unlike that usually found in the *Asterolecaniinae* and, in fact, unlike any that I have seen. This peculiarity arises from the fact that the delicate filamentous prolongation of the duct arises some distance before the apex of the larger portion. The anal ring is quite large and cellular.

The first stage larva bears a few trilocular pores instead of 8-shaped pores. The anal ring is very large, heavily chitinized and

cellular and bears six large setæ. The terminal segment of the body is strongly chitinized. The antennæ are 6-segmented.

Material examined.—Specimens from the type material.

***Cerococcus ovoides* (Ckll.)**

(Fig. 16.)

1901. *Pollinia ovoides* Ckll., The Entom., vol. 34, p. 225.

1909. *Pollinia ovoides* Ckll.; Green, Coccidæ Ceylon, pt. 4, p. 340.

The description given by Cockerell needs to be amplified at several points.



Fig. 16.—*Cerococcus ovoides* (Ckll.); dorsal aspect of anal lobes of adult female, anal ring and setae not indicated.

The adult female is in general form entirely like the other members of the genus to which I am referring the species. Legs entirely lacking. Pores of the 8-shaped type small, confined to a narrow zone extending about the body at the lateral margin. Tubular ducts abundant, small, slender, usually presenting an elbowed appearance. Two pairs of cribriform plates present, the members of each pair close together. Anal ring with 10 setæ. Anal lobes quite small, their mesal margins but slightly chitinized. Between the lobes is the characteristic "cauda" of the genus.

Cockerell states that the antennæ of the first stage larva are 6-segmented, but all the specimens examined by me show but 5 segments. The matter is not especially important as the first stage larva in other species of this genus may show either 5 or 6 segments. The 8-shaped pores of the dorsum are much smaller than those of the marginal series.

Specimens examined.—Part of the type material.

Notes.—Green has already pointed out (ref. cited) that this species appears to be close to *Cerococcus*. I am unable to find any basis for separating it generically from *C. quercus*.

SYNOPSIS OF THE GENUS TEGRODERA.

(Order, Coleoptera; Family, Meloidæ.)

BY FRANK E. BLAISDELL, SR., SAN FRANCISCO, CAL.

Recently while studying the Meloidæ in the collection of the California Academy of Science, San Francisco, a small series of ten specimens of a form of *Tegrodera* from Arizona was studied and considered worthy of a name. It is a race of *Tegrodera erosa* Lec., and its description will give an opportunity to review the genus as a whole. The species and races of *Tegrodera* have never been brought together in one paper, and the present time seems to be very opportune for so doing.

The genus *Tegrodera* was erected by Le Conte. It is characterized by having the penultimate joint of the tarsi cylindrical, the lower portion of the claws shorter than the upper and connate; the labrum is emarginate and the body glabrous.

The species and races may be separated as follows:

Elytral reticulations small and close; transverse fascia broad, subequal in width and distinct; meshes more or less pale to black.....*laticincta*.

Elytral reticulations coarse and well separated; transverse piceous fascia variable.

Transverse fascia obsolete, reduced to a subtriangular marginal blotch; meshes yellow.....*inornata*.

Transverse fascia narrow, more or less constricted at middle of each elytron, sometimes divided into a marginal and sutural subtriangular blotch; meshes piceous black.

Suture pale, sometimes blackish in basal third, meshes black.....*erosa*.

Suture black, meshes decidedly black as a rule, the black tending to diffusion.....*aloga*.

***Tegrodera erosa* Lec.**—Head red, pronotum black or varied with red. Elytral reticulations very coarse; colour pale orange yellow with the tips always piceous for a short distance. Legs and under surface of the body black.

In the male the oblique frontal grooves and fovea of the vertex are strong; the median frontal fovea is similar in
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development. The last abdominal segment is slightly emarginate at apex.

Length 16.0–27.0 mm.

Typical *erosa* is very abundant in Southern California (San Diego Co.) and Northern Lower California. It is markedly gregarious in large or small companies. In the author's boyhood days the insect was known as the "soldier-beetle" in Poway Valley (twenty-five miles northeast of San Diego.) This name was given to it on account of the peculiar habit they have, when disturbed, of raising the elytra and wings perpendicularly, showing the bright red of their upper abdomen and walking as high as possible on their legs. The red head, red abdomen and yellow elytra, with the bandy-legged way of marching and falling into single file—one after the other, gave a peculiar soldier-like aspect to their actions.

Erosa apparently feeds upon various plants. The author's mother—Mrs. Anna G. Blaisdell—states that in 1907, when collecting a large series on Kent's Ranch at Poway, a large alfalfa field was inhabited by thousands of this beetle, feeding upon the alfalfa. Mr. L. Kent, owner of the ranch, stated that the tumbleweeds (a species of *Amaranthus* that grows to an immense size and is blown about by the wind in the fall of the year) are completely defoliated by them.

In those individuals of *erosa* in which the transverse piceous-black fascia of the elytra becomes more or less obsolete, the meshes remain black and do not become pale as in *inornata*.

Habitat.—California (Poway, San Diego Co., July 5th, elev. 700 ft., Soboba Springs, Riverside Co., June; E. P. Van Duzee, collector). Lower California (Tia Juana).

Bibliography.—Annals Lyceum, V, 159; Trans. Amer. Ent. Soc., June, 1870, p. 93; Trans. Amer. Ent. Soc., XVIII, Feb., 1891, p. 390.

***Tegrodera inornata*, n. var.** (A race of *erosa* Lec.). Head red, prothorax rufo-piceous to black varied with red. Elytra very coarsely reticulate, middle transverse band entirely wanting, except a small sub-triangular marginal blotch, meshes always yellow.

Dr. Horn mentions a pale form taken by Mr. Gabb in Lower California. During fourteen years residence in Poway Valley, the author never saw a completely pale form of *erosa* Lec., although

the transverse piceous band was at times very much reduced and subobsolete, but in these individuals the elytral meshes were always black. *Inornata* is described so as to correlate the variants of *erosa* more exactly.

Length 23.0–27.0 mm.

Holotypes are in the collection of the California Academy of Sciences. Paratypes are in the author's collection.

Habitat.—Arizona. Exact locality has not been recorded on the specimens studied.

Tegrodera aloga Skinner.—(A race of *erosa* Lec.) Head red, antennæ and collar black. Thorax red or variegated with black. Elytra bright yellow, reticulate; black between the reticulations, with apices black. There is a transverse piceous fascia, constricted in the middle of each elytron. Elytral suture black. Abdomen and legs black. Length 14.0–26.0 mm.

Habitat.—Near the banks of the Gila River, near Florence, Arizona. Collected on May 4th, 1903, by Mr. C. R. Biederman.

Holotypes in the collection of the Philadelphia Academy of Natural Sciences.

Dr. Skinner states that his series of sixteen specimens shows no variations, except in size. It differs from *laticincta* Horn in being more coriaceous, the reticulations being much coarser and showing the background more conspicuously. The transverse elytral fascia in *laticincta* is wider and not constricted in the middle of each elytron. It may be distinguished at once from *erosa* Lec. by the distinct, black suture.

Bibliography.—Ent. News, vol. XIV, No. 6, June, 1903, p. 168.

Tegrodera laticincta Horn.—Head red, pronotum black or varied with red; antennæ black. Elytral reticulations more or less close, with a rather wide and exactly transverse piceous fascia at middle; meshes variable as to colour in the same individual, pale to black, general colour being yellow; piceous area at apex better indicated.

Length 19.0–22.0 mm.

Habitat.—California (Owens Valley; type region (Horn). Freeman and Bishop, Inyo Co., June, Dr. A. Fenyès collector).

Bibliography.—Trans. Amer. Ent. Soc., XVIII, Feb., 1891, p. 390.

NEW AND LITTLE-KNOWN CANADIAN OSCINIDÆ.*

BY J. M. ALDRICH, BUREAU OF ENTOMOLOGY,
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In 1915 and 1916 the writer received for study many lots of small flies swept by Mr. Norman Criddle at Aweme and Treesbank, Manitoba, on grains and grasses. In a few cases he added material from other points. These accumulations came to represent the Oscinid fauna of the region quite fully, and to contain several undescribed species in some numbers. It is the purpose of the present paper to describe a few of the most abundant species and to clear up some obscurities about several genera and species; it does not by any means exhaust the material which Mr. Criddle furnished with infinite industry, persistence and patience.

Type material in all the species will be deposited in the Canadian National Collection, and also in the United States National Museum.

LASIOSINA Beck.

This genus, described by Becker in 1910 in the first part of his *Monographie der Chloropiden* (Archivum Zoologicum, 1, 73), has for its type *Chlorops cinctipes* Meig. (*Diplotoxa inconstans* Lw.), and originally included two other European species. Two of the three had been described in *Diplotoxa* by Loew, the other being new.

The genus, therefore, represents a subdivision of *Diplotoxa*, from which as restricted it differs in having longer thoracic and frontal bristles, and the cross veins less approximated, separated by about twice the length of the hind one.

Becker did not see any North American material. The first species to be found on this continent was a single female from Springer, N.M., in the National Museum, which Malloch described (Proc. U. S. N. M., XLVI, 140, 1913) as *Euchlorops similis*, placing it in the *Milichinae*. From *Euchlorops vittata*, the type species of the genus, *similis* differs in having but one dorsocentral bristle, the former having a row of four. I have examined both types and also the European *L. albipila* Lw., the last in Professor Melander's collection. We have a common northern species which has come into my possession only since I saw the type of *similis*;
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I am indebted to Mr. Chas. T. Greene for making comparisons with the latter, from which I conclude that it is a distinct species.

***Lasiosina canadensis*, n. sp.** (Figs. 17, 18, 19).

Front more than half the head-width, flat, somewhat projecting over antennæ, pale yellow in colour, with the following pairs of bristles, large for the family: 3 and sometimes 4 fronto-orbitals; 1 divergent ocellar; 1 convergent post-vertical or post-ocellar; 1 inner vertical, strongly convergent, just outside the hind angle of triangle; 1 outer vertical, strongly divergent, on a slight swelling farther back than preceding; there are also 40 or 50 small black hairs, mostly on the anterior half of front, of which one or

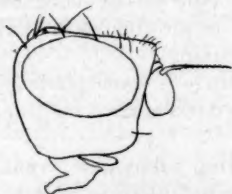


Fig. 17.—*Lasiosina canadensis*, head of male, side view.

two pairs near the median line may be a little larger. Triangle distinct, of moderate size, its sides convex, the apex drawn out in a slender point which almost reaches the extreme anterior edge of the front; ocellar dot black, connecting with black of occiput, rest of triangle dark yellow to brown, subshining, often with darker margin. Face and bucca light yellow, the latter over half the eye-height; eye strikingly elongated lengthwise of the head; antennæ of moderate size, yellow, in the female the third joint wholly infuscated, in the male it is largely or wholly yellow, the infuscation usually confined to a spot at base of arista; the latter black, bare, Palpi yellow in male, distinctly brown in female. A pair of small, pale vibrissal hairs. Back of head yellow except centrally and directly behind the posterior curve of eye.

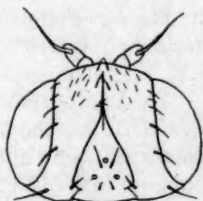


Fig. 18.—Same from above.

Thorax opaque yellow to reddish, the notum with three broad opaque black stripes, the middle one narrowed or abbreviated behind, lateral ones distinctly shortened in front, not connected with the dark of humeri; scutellum yellow, its sides blackish; post-notum dull black; pleuræ with a shining black spot on lower edge

of mesopleura and a larger on the sternopleura, the latter, however, opaque below; an opaque black spot on pteropleura and one above hind coxa. Halteres white. The bristles of the thorax are as follows: humeral 2-3; notopleural 3; postalar 1; posterior dorsocentral 1; scutellum 2 pairs, the outer small.

Abdomen rather uniform subshining brown above, the last segment more or less yellow; the hairs are pale except along the sides apically and on last segment, the male showing more dark than the female; male hypopygium black, shining.

Legs dark yellow including tarsi, but there is some tendency to a dark ring on hind tibiae and to a vague darkening of the front tarsi and the basal half of hind femora.

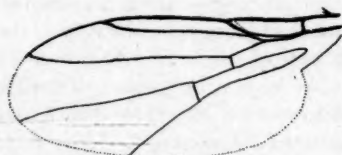


Fig. 19.—Same species, wing.

Wing subhyaline, venation as in *Chlorops*; the distance between cross veins is from $1\frac{1}{2}$ to 2 times the hind one.

Length 2-2.6 mm.

Eleven males and twenty-two females. The male is from Ogema, Sask.,

June 16, 1916;. Paratypes are from Ogema (6) and Estevan (2), Sask.; Treesbank and Aweme, Man., (18); Sheridan, Wyo., (1, Metz); Pullman, Wash., (1, Melander); Bovill, Ida., (1, Melander); Powell Co., Mont., (1, Mann); and Saranac Lake, N.Y., (1, Johanssen).

The type of *similis* Mall. is in general very similar, but although a female it has the antennae and palpi coloured as in the male of *canadensis*, and "tibiae darkened from near base, becoming black at apices; tarsi black."

The European *cinctipes*, type of the genus, has the same sexual distinctions in the colour of antennae and palpi as in *canadensis*, or essentially the same.

DICRAEUS Loew.

This genus was established in Berl. Ent. Zeitsch. in 1873 (XVII, 51) for the single species *obscurus*; Becker (Mon. Chlor. I, 111, 1910) regards this as synonymous with *raptus*, Haliday

(Ann. Nat. Hist., XXII, 187, 1838, as *Oscinis*). Thus the type species becomes *Dicraeus raptus* Hal. Loew gives as generic characters that the costa ends before reaching the fourth vein, the hind cross vein is absent, and the second vein is straight, unusually long, and parallel with the third. He placed it in *Chloropinæ* on the costal character. Becker (op. cit., 109) finds five species of the genus in Europe, of which only one lacks the hind cross vein, while three have the costa fully reaching the fourth vein. Thus he makes absence of the cross vein only specific (Strobl, in Tief's Nachlass, 64, 1901, had argued that it is merely varietal); and what is more surprising, he reduces to specific value in this little group the costal character also, which elsewhere in the family is decidedly of subfamily importance, and has been so considered by Becker himself (the first dipterist to make use of the character was Fallén, *Oscinides*, 1820, p.3; he separates two groups of his genus *Oscinis* by it). In Becker's use of *Dicraeus*, the chief generic character is the unusually long second vein; he places the genus, I think correctly, in *Oscininae* close to *Oscinis*.

In his treatment of the nearctic *Oscinids* (Mon., IV, 103, 1912), Becker mentions the European *Dicraeus ingratus* Loew (*Zeitsch. f. Ent. Breslau*, XX, 26, 1866, as *Eutropha*) as occurring in Idaho and Washington, but says the specimens have a little shorter second vein than the European. However, on examining my two Idaho specimens returned by him, I find that they have the costa evidently reaching the fourth vein, so they would not go to *ingratus* in Becker's own table of the European species. The same is true of all but one of about 70 specimens that I have since accumulated. The character is possibly not of specific value, though so taken by Becker. I have not seen European material, and the case is not free from doubt; but in view of the discrepancies and the geographical separation I believe myself justified in describing ours as a distinct species. The figure of the wing shows the course of the second vein, which is the main generic character; the rest is included in the description.

***Dicraeus incongruus*, n. sp. (Fig. 20).**

Shining or subshining black robust species. Frontal triangle subshining, not very distinctly bounded, ending acutely at about

the second third of the front; anterior third or more of front broadly yellow; antennæ dark yellow, third joint small, round, with darker upper edge or more; arista short, bare; face, epistoma and bucca yellow, the last with narrow shining black lower edge, the dark line continuing up nearly to the antenna, between the parafacial and central part of face; bucca from one-fourth to one-third the eye-height; palpi brown; edge of mouth black; proboscis small, blackish; eyes round, bare; back of head black. Front with four or five minute orbitals; ocellars minute, erect, convergent.

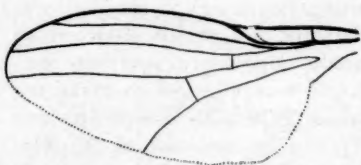


Fig. 20.—*Dicroeus incongruus*, wing of female.⁴

Mesonotum shining black, yet with very thin, delicate pruinosity, the abundant minute hairs not arranged in rows, and no noticeable punctures. Chaetotaxy: dc. 1, hum. 1, stpl. 3, postal. 2, sc. 2 pairs nearly equal, erect. Pleuræ shining

black except upper hind part of mesopleura and the region behind and just below the wing. Halteres lemon yellow with brown stem. Scutellum concolorous with mesonotum.

Abdomen black, not very shining, with only a few hairs, which are black; the male has a polished, knob-like black genital segment, from which project forward a pair of long, stout, nearly straight black forceps, reaching almost to the hind coxæ, very characteristic.

Coxæ, trochanters, and femora black, the knees narrowly yellow; hind tibiæ black to tip, a little widened, not with "sense organ;" fore and mid tibiæ yellow to brownish, tarsi wholly yellow.

Wings distinctly milky, veins black, the fifth paler, especially its last segment; the first vein is merely a light streak in the wing, invisible except in favourable light, at its apex the costa is broken more distinctly and widely than in any other Oscinid that I know. As this wide break is shown in Becker's figure of the type species, it is probably of generic importance. Venation as figured. In order to determine the trustworthiness of the costal character, I measured with eye-piece micrometer the distance between the tips of the first and second veins, and between the second and third,

dividing the former by the latter. This I did with five specimens of each sex: the males gave 2.63; 2.70; 2.75; 2.81; and 2.20,—average 2.62;—while the females gave 2.75; 3.50; 3.50; 3.00; and 4.00,—average 3.35.

Length 1.5 to 1.7 mm.

Seventy-five specimens, both sexes: 68 from Treesbank, Man., (Criddle); 2 Moscow, Idaho, determined by Becker as *Dicraeus ingratus*; 1 Potlatch, Idaho; 1 Emigration Canyon, Utah, back of Salt Lake City, about 7,000 feet; 3 Powderville, Mont., (R. R. Parker). The Potlatch specimen is dated June 20, the rest all in July.

ELACHIPTERA PLANICOLLIS, Beck.

Becker, Mon. Chlorop., IV, 114, 1912 (*Oscinella*).—Collins, Ida. (By mistake Collins, Texas).

The type is in Professor Melander's collection, and until I saw it in 1916 I failed to identify the species, having it in my collection as *Elachiptera n. sp.* It is in reality very closely allied to the abundant *Elachiptera longula*, having the same elongated shape, diagonal eye, flattened thorax and scutellum; but differing in having the arista not thickened and all the femora black. The colour as in *longula* is opaque, but inclines more to plumbeous. As far as the arisal character is concerned, there is a little variation in the thickening in both species, so I have specimens running together in this respect. Becker placed *longula* in *Melanochæta*, in which he also placed *aliena*, a species having a plain arista like that of *planicollis*; but at the same time he admitted that there was no natural line of division between *Elachiptera* and *Melanochæta*, either in the European or North American fauna.

My specimens of *planicollis* are the following: 26 from Treesbank and Aweme, Manitoba, collected by Mr. Criddle from June to September; 4 from Chatcolet, Idaho, August 15, collected by Professor Melander; and 1 from Waubamie, Ont., near Parry Sound, collected by H. A. Parish.

Oscinis criddlei, n. sp. (Fig. 21.)

A black species with the fore and middle tibiae and all the tarsi wholly yellow, and the third antennal joint subangulated above at apex.

Eyes hairy; frontal triangle shining black, short, ending in an acute angle about the middle of the front; rest of front opaque, blackish, the lower part sometimes indistinctly paler; antennæ black, third joint reddish on inner side, rather large and of very characteristic shape, almost angulated above apically; arista bare; epistoma and bucca varying from dark yellow to brown, the latter about one-fourth the eye-height; palpi black; proboscis small, short, dark; occiput black. Thorax and scutellum above sub-pollinose, gray, the black ground colour very evident, shining through; the pollen of dorsum extends down over the hind part of the mesopleura, and also behind the wing to the halter, which is yellow; rest of pleura shining black; scutellum with a pair of good-sized bristles at apex, and a much smaller pair outside and higher. The mesonotum has short, stout, brown hairs, rather scattered; in strong light they look pale. Abdomen black above, generally more brownish basally, with scattered pale hairs. Coxæ, femora and middle of hind tibiæ black; trochanters, tips of femora, front and middle tibiæ, all but middle of hind tibiæ, and all tarsi to their tips, yellow; claws black. Wings hyaline, veins rather pale, venation ordinary; tip of second vein at



Fig. 21.—*Oscinis criddlei*, antenna, inner side.

$\frac{3}{5}$ the distance from the first to the third.

Length $1\frac{1}{2}$ mm.

Fifty-eight specimens, both sexes, all taken in July and August at Treesbank and Aweme, Manitoba, by Norman Criddle, in whose honour I name the species in appreciation of his active and continued assistance in my work on flies of this family.

Oscinis scabra, n. sp.

An opaque gray, short, broad species allied to *trigramma*, but not vittate. Front almost one-half the head-width, square, the short, opaque triangle blending with the rest, lower half of front yellow, slightly prominent above antennæ, the whole surface punctured except close about ocelli, the setæ very short, hardly visible; antennæ yellow, third joint orbicular, infuscated on apical half, arista short, bare; palpi yellow, proboscis small, retracted; bucca yellow, one-third the eye-height; back of head opaque gray.

Thorax short and broad, square, flat, densely gray pollinose on black ground, with distinct, close punctures which are not arranged in rows and bear only minute hairs, giving the mesonotum a bare appearance; the lateral setæ very short but stout; scutellum a little elongated, flat, punctured and concolorous with dorsum, with only one pair of apical setæ of noticeable size; pleuræ black, gray-pollinose except in the depressions above the front and hind coxæ; postnotum shining black; halteres yellow.

Abdomen subshining black above, indistinctly paler basally, opaque black below.

Legs including coxæ opaque black, the knees vaguely, the tibiæ except a broad, median ring on middle and hind ones, and all the tarsi yellow.

Wings subhyaline, veins blackish, the costal segment before the tip of second vein less than double the one beyond it.

Length 1.3 to 1.5 mm.

Thirteen specimens, both sexes: ten from Treesbank, Manitoba, May 6, 1916, including the type, a female; two Aweme, Manitoba, Sept. 12 and Oct. 13, 1916; one Estevan, Saskatchewan, May 20, 1916. All collected by Norman Criddle.

NEW HALICTINE BEES FROM CHILE.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The Chilean bee-fauna is one of the most remarkable in the world, many of the species having a facies quite distinct from those of other parts of South America. Many species were long ago described by Spinola; others have been made known at intervals since, but there can be no doubt that very many remain to be discovered.

Agapostemon (Pseudagapostemon) xanthorhinus, sp. n.

♂.—Length about 7.5 mm.; anterior wing 5.5; bluish-green; clypeus (except two dots and narrow lateral margins), labrum and mandibles (except black basal spot and ferruginous apex) yellow; a yellow stripe across tubercles; legs bright yellow, with the coxæ, trochanters, anterior femora basally, middle and hind femora

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largely behind (but not apically), piceous; clypeus produced, but ordinary; sides of face with dense, appressed; very pale yellowish hair; front dull and granular; antennæ long, the scape and two following joints yellow, the others pale ferruginous, the flagellum more or less dusky above, especially at base; fourth antennal joint about as long as second and third together; mesothorax and scutellum densely punctured but shining, with thin, rather long, pale hair; basal area of metathorax covered with coarse, vermiform rugæ; tegulæ pale, with a yellow spot; wings hyaline, stigma pale ferruginous, nervures testaceous; first recurrent nervure joining second submarginal cell beyond the middle; hind legs not modified; abdomen closely punctured but shining, with thin hair, but no bands; apical segment pale reddish, emarginate; venter mainly yellow, hind margin of fourth segment broadly W-like, the margins of the notch ferruginous.

Chile (E. C. Reed), U. S. Nat. Museum. Closely related to *A. citricarnis* (*Halictus citricarnis* Vachal), but that species differs by the somewhat greater size, the presence of yellow depressed hair on abdomen, the granular area of metathorax, the yellow antennæ, and the slightly emarginate fourth ventral segment. Also related to *A. paulista* (*Pseudagapostemon paulista* Schrott.), but differs in being smaller, with yellow mandibles. It has the clypeus yellow with two dots, as in *A. paulista*, not as in *A. nasua* (*Pseudagapostemon nasua* Schrott.). It does not seem advisable to regard *Pseudagapostemon* as more than a subgenus.

***Rhopalictus corinogaster chiloeensis*, subsp. n.**

♀.—Wings dusky, nervures pale fuscous; tegulæ black, anteriorly margined with testaceous; legs and antennæ darker; abdomen darker red, first segment black except the broad, apical margin.

Island of Chiloe, Dec., 1894. Collector unknown. Type in my collection.

***Rhopalictus callicladurus*, sp. n.**

♂.—Length about or nearly 9 mm.; head and thorax metallic green, with abundant white pubescence; labrum, mandibles and apex of clypeus pale testaceous; eyes deeply emarginate and

strongly converging below; antennae very long, the rather swollen scape black; the flagellum ferruginous, dusky above, strongly crenulate; front, sides of thorax and metathorax blue-green, but face, mesothorax and scutellum yellowish green; mesothorax finely punctured but moderately shining; area of metathorax with radiating plicae, more or less connected by cross-ridges; tegulae pale testaceous; wings ample, hyaline, stigma and nervures sepia; first recurrent nervure joining second submarginal cell very near end; tibiae and tarsi, and much of apical part of femora, bright ferruginous, but femora otherwise green; abdomen clavate, long and slender, first segment swollen dorsally; first segment practically black above, second and third very bright ferruginous, fourth and fifth deep metallic green with hind margin red, apex red.

Chile (*E. C. Reed*), U. S. Nat. Museum. Easily known by the peculiarly coloured abdomen, but nearest to *R. corinogaster* (Spinola).

***Rhopalictus melanocladus*, sp. n.**

♂.—Length about 8.5 mm.; head and thorax black, with white hair, the entirely dull and granular front, vertex, mesothorax and scutellum with a faint greenish tint; clypeus and labrum black, mandibles dark reddish beyond middle; eyes deeply marginate and strongly converging below; antennae extremely long, black, the flagellum dark coffee-colour below, and strongly crenulate; area of metathorax strongly reticulate; tegulae dark rufo-fuscous; wings brownish-hyaline, stigma and nervures dusky-ferruginous; second submarginal cell not very broad, receiving first recurrent nervure a short distance from its end; legs black, with the long tarsi; pale ferruginous; abdomen elongate, clavate, first segment swollen dorsally, but its apical part in a straight line with second (which is not true of *R. callicladurus*); abdomen black, with a very faint greenish tint, hind margins of segments obscurely reddish; apex pale ferruginous.

Chile (*E. C. Reed*), U. S. National Museum. Related to *R. chilensis* (Spin.), the type of the genus, but readily distinguished by the dark abdomen and the shape of the second submarginal cell.

AFRICAN BUPRESTIDÆ (COL.) OF THE GENUS STERNOCERA.

BY RICHARD T. GARNETT, BERKELEY, CAL.

The following table will separate the various forms of *Sternocera interrupta* Olivier:

- I. Impressions of elytra present.
 - A. Foveæ of thorax and elytra with white pilosity.
 - B. Beneath dull bronze, above black; elytra black or dull castaneous, lighter punctured.....*S. interrupta* Olivier.
 - BB. Entirely dull bronze; elytra rugose.....var. *reticulata* Kerremans.
 - AA. Foveæ of thorax and elytra golden.
 - B. Entirely bronze; base of abdominal segments metallic purple.....var. *klugi* J. Thomson.
 - BB. Below golden green; elytra castaneous.....var. *mephisto* J. Thomson.
 - AAA. Fovea of elytra red.....var. *vandykei*, subsp. nov.
- II. Impressions of elytra absent.....var. *immaculata* Kerremans.

S. interrupta Olivier. Thorax entirely covered with irregular pits, smaller towards the middle and filled with white pubescence; beneath sombre bronze, above black, elytra black or sombre castaneous, more smoothly punctured. Elytra with 2 vittae at base on each side filled with white pilosity, the inner one small and short, the outer one long and broader and another on the elytral fold beneath the humeral umbone; posterior half of elytra with long vitta on each side filled with whitish pilosity, this vitta often broken up. Beneath rugose, entirely covered with the same white pubescence, except the median line where the pubescence is scanty or lacking altogether. Length: 27-42 mm. Width: 10-15 mm. Habitat: Damaraland; Senegal; Zambesi; Dakar.

Var. **reticulata** Kerremans. Entirely sombre bronze, metallic, with the elytra very strongly reticulate. Length: 26-35 mm. Width: 10-13.5 mm. Habitat: Senegal; Guinee.

Var. **klugi** Thompson. Fovea of thorax and elytra golden; entirely bronze; base of abdominal segments metallic purple. Length: 34 mm. Width: 13 mm. Habitat: White Nile; Senegal.

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Var. **mephisto** Thomson. Fovea of thorax and elytra golden; Beneath golden green, shining; elytra castaneous.

Habitat: White Nile; Senegal; Benue; Niger.

Var. **vandykei** subsp. nov. The form, size, and punctuation are as in *S. interrupta* Olivier but the colouring is radically different from that of other varieties. Head and thorax the same as *interrupta*. Differs by having all the elytral impressions filled with red pilosity including the one below the humeral umbone; also by having a row of semi-triangular red spots on each side of the abdominal segments, those on the fourth and fifth segments largest, that on fifth running from top to bottom and from margin inwards from each side for $\frac{1}{3}$ the width of the segment; segment 4 also has 2 extremely small more rounded spots in centre, not spaced evenly; the pilosity being otherwise normal and white. This variety is remarkable in that both red and white pilosity is present and the hairs of each colour are equally dense on the ventral surface of the abdomen. Length: 36 mm. Width: $14\frac{1}{2}$ mm. Habitat: Bafulabe (Senegal). One specimen. Type in my collection.

Taken by W. F. Blakeslee. The specimen was sent to me loose and as a result it has lost $2\frac{3}{5}$ tarsi and 1 joint of an antenna. I take great pleasure in naming this after my friend and former teacher, Dr. Edwin C. Van Dyke of Berkeley, California.

Var. **immaculata** Kerremans. Impressions of elytra absent.

Stevensii and its one good variety may be separated as follows:

- A. Thorax black; elytra castaneous.....*S. stevensii* Waterhouse.
AA. Thorax brassy; elytra very dark brown, with blue reflections.....var. *waterhousei*, subsp. nov.

S. stevensii Waterhouse. For description of this and its variety I will quote Mr. Waterhouse in toto. "Resembles and is closely allied with *S. interrupta*, but it differs in the sculpture and ornamentation of the abdomen. Head and thorax black, with numerous moderately strong punctures and a median impressed line, all filled with whitish pubescence, as in *interrupta*. Each elytron with a small dirty white spot near the scutellum, an elongate spot in the middle of the base, a longer one below the shoulder, and a line behind the middle (near the side). Body beneath dark aeneous. Abdomen marked with punctures, each puncture bearing an obscurely brassy hair. These punctures are placed in

groups of 2 or 3 or in undulating lines at the sides of the segments. On the 3rd and 4th segments these punctures are crowded together so as to form an undulating band, leaving a smooth shining spot on each side at the base, and a wide, triangular, sparingly punctured area in the middle. Punctures in the apical segment crowded together so as to form triangular patches on each side, leaving the middle space sparingly punctured." Length: 35 mm. Width: 13 mm. Habitat: West Africa; N. Nigeria.

Var. **waterhousei** subsp. nov. "Thorax brassy. Elytra very dark brown, with blue reflections." Habitat: Damaraland. Mr. C. O. Waterhouse in Ann. Mag. Nat. Hist. No. 82, p. 248 gave this variety without a name, and I have taken the liberty of affixing one to it, the characters given seeming sufficient to warrant it.

A GROUP OF AMERICAN HALICTINE BEES SIMULATING THE OLD-WORLD GENUS NOMIOIDES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The gaily-marked little Halictine bees of the genus *Nomioides* are widely distributed over the Old World, even extending to Australia (*N. perditellus* Ckll.). They are extraordinarily like our American species of *Perdita*, but structurally are so distinct that we can hardly suppose that there is any particular affinity. More recently, however, there has been found in South America a group of *Nomioides*-like insects which might almost be referred to the Old World genus, did they not possess a sharply pointed marginal cell as in *Halictus*. This affords another instance of similarity between neotropical and Old World insects, which may be due to common descent or to "convergent evolution," or to both. The group referred to, with ten described species, has been found in the Andean region, but it now appears that it extends northward to Panama. The following new species has been collected by Mr. Busck.

***Halictus xanthinus*, n. sp.**

♀.—Length 5 mm. or a little over; head and thorax brilliant emerald green; mandibles pale yellow; clypeus ferruginous in middle and dusky reddish apically, but above and at sides green; October, 1918

sides of face shining; inner orbits concave but not abruptly emarginate; scape long, black; flagellum dark above and ferruginous beneath; mesothorax dull and granular, with fine, very short, pale pruinose pubescence; tubercles yellow; tegulae light fulvous; wings hyaline, nervures fuscous, outer nervures not weakened; first recurrent nervure joining extreme apex of second submarginal cell; area of metathorax large, microscopically reticulate, not plicate; legs pale yellowish or fulvous, the middle and hind tibiae and tarsi fuscous, the middle tibiae pale in front; hind spur with three very long spines; abdomen broad, smooth and shining, reddish fuscous and fulvous marked with lemon yellow; first segment broadly yellow basally and at sides except apically, where it is dark brown, but otherwise the segment is pale fulvous; second and third segments with a broad, yellow basal band, widest sublaterally, the segments otherwise fulvous in middle and dark brown laterally; fourth and fifth segments reddish-fuscous, with basal yellow bands; venter pale yellow, with the last three segments fuscous.

Porto Bello, Panama, March 13, 1911. (*Aug. Busck*), U. S. Nat. Museum. Nearest to the Brazilian *H. callichroma* (Ckll.), but with entire yellow bands on abdomen. The structure of the metathoracic enclosure is quite the same, with fine reticulations, the lines mostly transverse. Of the other species of the group, I possess *H. ephelix* Vach., from Marcapata, Peru; *H. phacodes* Vach., from Mapiri, Bolivia; and a cotype of *H. maculiventris* (Crawford), described under *Augochlora*. Crawford's species seems doubtfully distinct from *H. trinax* Vach., but I have no authentic material of the latter. Crawford and I, describing species of this group, have referred them to *Augochlora*. Vachal referred all the species to *Halictus*, but he included *Augochlora* in *Halictus*. Schrottky in 1910 placed the species in his genus *Nescorynura*. They are certainly not genuine *Augochlora*, nor do they agree well with typical *Nescorynura* or *Halictus*. They may be considered a distinct subgenus of *Halictus*, or even a separate genus. I do not propose a name, because it is possible that *Ctenocarynura* Schrottky (*Deutsch. Ent. Zeit.*, 1914) is applicable. I have not been able to procure Schrottky's description, and there is no reference to the genus in the Zoological Record.

RECENT CANADIAN PUBLICATIONS.

Under this heading we propose to present notices from time to time of entomological publications by writers residing in Canada, or such as appear in Canadian periodicals, whether by Canadians or not. Exceptions will be made in the case of papers published in the Annual Reports of the Entomological Society of Ontario and the present journal. Short articles or those of a popular character will, as a rule, be merely listed.

Authors will greatly assist the Editor by sending him copies of their publications for notice in this section.

The following papers were all published during the present year:

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF NOVA SCOTIA FOR 1917. No. 3. Truro, January, 1918. Pp. 1-96.

This excellent report gives ample evidence of the vigorous condition of the youngest branch of our Society, and is a most creditable production. It contains no less than sixteen papers by ten contributors, dealing with a variety of subjects, both economic and faunistic, and these are illustrated by 15 plates, most of them half-tones of fine quality.

The following papers are mainly of economic interest:

Work of the Dominion Entomological Laboratory in Nova Scotia. By G. E. Sanders. An outline of the results of experiments testing the effects of different combinations of insecticides and fungicides in apple spraying.

Notes on the Yellow Leaf Hopper of the Birch (Oncopsis sobrius Walk.). By W. H. Brittain. The life-history is given in detail and is illustrated by two plates, showing all the stages, and the hymenopterous parasite, *Polynema striaticorne* Gir.

Miscellaneous Notes on the Apple Maggot. By W. H. Brittain.

The Zebra Caterpillar. By H. G. Payne.

The Fall Cankerworm. By H. G. Payne.

The Rusty Tussock Moth. By H. G. Payne.

The White-marked Tussock Moth. By H. G. Payne.

Detailed life-histories of these four species are given, based on original data. They are illustrated by 5 excellent photographic plates.

October, 1918

Empoasca unicolor as an Apple Pest. By W. H. Brittain and L. G. Saunders. Discusses the injuries caused by this insect, its life-history and methods of control. One plate.

Introduction of the Parasites of the Brown Tail and Gipsy Moths into Canada. By L. S. McLaine. A concise account of the methods employed in collecting and rearing the three important natural enemies of the Brown Tail and Gipsy Moths, viz., *Apanteles lacticolor*, *Compsilura concinnata* and *Calosoma sycophanta*, and their introduction and liberation into the infested parts of New Brunswick and Nova Scotia

The Dropping of Apples Caused by Spraying with Lime-Sulphur. By G. E. Sanders and A. Kelsall. A valuable paper, discussing the available data on this problem, including original investigations on the factors which influence lime-sulphur injury in Nova Scotia.

Notes on the Biology of Lygus pratensis in Nova Scotia. By W. H. Brittain and L. G. Saunders. Discusses the life-history of this injurious insect, its food habits at different periods of the life cycle, oviposition, injuries, etc.

The papers dealing with general and faunistic subjects are as follows:

The Tree Hoppers of Nova Scotia. By W. H. Brittain. This paper and the following one are part of a useful series of articles on the insects of Nova Scotia, designed to make their identification easier for the general student. Keys to the genera and species are given and descriptive notes on the latter. The life-history of *Publilia concava*, not previously known, is given in detail. Twelve species are listed and are illustrated in 5 plates.

The Locustidæ of Nova Scotia. By C. B. Gooderham. Contains keys to the subfamilies, genera and species. Six species are recorded, all of which are described and five of them illustrated in detail.

Some Reasons for Studying Pupæ. By Edna Mosher. A suggestive paper, showing the need of more careful study of pupæ from various points of view, economic, taxonomic and morphological.

Some Notes on the Crambinæ of Nova Scotia. By E. Chesley Allen. An annotated list of 21 species of these moths.

Spiders Collected in Nova Scotia and New Brunswick by Robt. Matheson in 1912. By J. H. Emerton. Seventy-two species are listed.

PUBLICATIONS OF THE ENTOMOLOGICAL BRANCH, DOMINION DEPARTMENT OF AGRICULTURE.

In the effort towards increasing food production the Entomological Branch is doing valuable national service. In connection with this work a series of circulars or "Crop Protection Leaflets" were issued and distributed during the early part of the year to be of timely value to growers during the present season. These leaflets dealt with the most approved methods of controlling the more serious insect pests, and are all appropriately illustrated.

Those published during 1918 are as follows:

- No. 3. *Cutworms and Their Control.* By Arthur Gibson.
- " 4. *Root Maggots and Their Control.* By Arthur Gibson.
- " 5. *Prevent White Grub Injury.* By Arthur Gibson.
- " 6. *How to Control Locusts or Grasshoppers.* By Arthur Gibson.
- No. 7. *Rats and Mice.* By C. Gordon Hewitt.
- " 8. *Aphids or Plant Lice.* By Wm. A. Ross.
- " 9. *The Pea Weevil.* By Arthur Gibson.
- " 10. *Arsenate of Lime.* By George E. Sanders.

The following articles by members of the staff of the Entomological Branch have appeared in the pages of the *Agricultural Gazette*, vol. 5, 1918.

The Black Cherry Aphis. By Wm. A. Ross (No. 1, pp. 13-16). Describes the history, habits and depredations, and the life-history of this pest. Illustrated from four photographs.

Some Results of Scientific Research on Insect Pests in Canada. By C. Gordon Hewitt, D. Sc. (No. 2, pp. 128-132). A brief exposition of the value of entomological research to agriculture and forestry as illustrated by some of the more striking results of the work of the Dominion Department of Agriculture.

The Alfalfa Looper, Autographa californica Speyer. By Arthur Gibson. (No. 2, pp. 132-136). This insect, which is widely distributed in Western North America, has been known as a pest in Canada only since 1914, when an outbreak occurred in British

Columbia. The habits, life-history, crops attacked, natural enemies and methods of control are described.

The Predacious Mite, Hemisarcophes Malus Shiner and its Relation to the Natural Control of the Oyster-shell Scale. By John D. Tothill. (No. 3, pp. 234-239, 3 figs.). This mite, which feeds on the eggs and sometimes the later stages of the oyster-shell scale is believed to be the most important single factor in the natural control of the scale in Eastern Canada. It has not been found in British Columbia.

Some Ladybird Beetles Destructive to Plant Lice. By Wm. A. Ross. (No. 4, pp. 344-347, 2 figs.). This paper contains brief descriptions and notes on the habits of the eight species of ladybird beetles which are most important in the natural control of aphids on the Niagara Peninsula. Experiments were made to determine the egg-producing capacity of each species, the duration of the various stages and the feeding capacity of the adults as measured by the number of aphids consumed in a given time.

The Habits and Control of White Grubs in Manitoba. By Norman Criddle. (No. 5, pp. 449-454). Mr. Criddle has made a careful study of the four species of *Lachnosterna* found in Manitoba (*L. anxia*, *nitida*, *drakei* and *rugosa*). He describes the general life-history of these beetles and the peculiarities of the habits and habitat of each species. He recommends ploughing between May 14 and July 1 at an average depth of 5 inches, this being a time when none of the stages are below plough line and when the largest number of all stages will be turned up, the majority being then usually picked up by birds.

He also discusses thoroughly the natural control of these insects and the crops most suitable for sowing on infested lands.

Some Blood-sucking Flies of Saskatchewan. By A. E. Cameron. (No. 6, pp. 556-561, 6 figs). An interesting general account of the more troublesome mosquitoes, black flies and horse flies of the Saskatoon district.

The Control of Insects in Ships by Steam. By R. C. Treherne. (No. 7, pp. 668-669). Describes an instance where a vessel infested with the rice weevil (*Calandra oryzae*) was freed from infestation by subjecting the hold to a high pressure of steam, after failure by an all-night fumigation with sulphur.

Some Notes on the Natural Control of the Cherry-tree Ugly Nest Tortricid, Archips cerasivorana Fitch. By A. B. Baird. (No. 8, pp. 766-771).

The action of the various parasites and other controlling factors is considered for each of the principal periods in the life-history, and their effectiveness is calculated on a percentage basis.

Other publications by the staff of the Entomological Branch are the following:

The White-marked Tussock Moth and its Control on Shade Trees and Orchard Trees. By J. M. Swaine and G. E. Sanders. Circular No. 11, March 7, 1918, 12 pp., 2 plates. This paper is divided into two parts. The first, entitled "The White-Marked Tussock Moth (*Hemerocampa leucostigma* S. & A.)" (pp. 1-11), by Mr. Swaine, gives descriptions of the various stages, the life-history, habits, kinds of trees attacked and the natural and artificial means of control. The second part, "The White-marked Tussock Moth as an Orchard Pest," (pp. 11, 12), by Mr. Sanders, describes the injuries done to fruit, and the spraying methods recommended for its control in orchards.

The Pear Thrips (Teniothrips inconsequens Uzel) and its Control in British Columbia. By A. E. Cameron and R. C. Treherne. Bull. No. 15, Entomological Branch, Dept. of Agriculture. May 8, 1918, 51 pp., 22 figs.

In this bulletin are set forth the results of a most careful and detailed investigation, extending over two years, of an insect, which has for many years been causing very serious injury to orchards on Vancouver Island, though known only since 1915 as the cause of this damage.

The chief injury consists in a "blighting" of the blossom buds in early spring, due to the entrance of the hibernated adults which feed upon the young delicate tissues within, and also to the later attacks of the larvæ, which hatch from eggs deposited in the petioles and midribs of the leaves, and the calyces and stems of the young fruit. The larvæ attack not only the blossoms and leaves but also the young fruit, causing a "russetting" of the skin known as "thrips scab." When mature the larvæ fall to the ground and, penetrating the soil, pass through the remaining stages, the

prepupal and pupal periods under ground, changing to adults late in the autumn and emerging early the following spring.

Although most destructive to pears, plums and prunes, the pear thrips readily attacks other fruit trees such as apples and cherries, besides many other trees and shrubs, the broad-leaved maple being one of the worst sufferers of all. It is not a native insect and is as yet unknown in Canada outside of Vancouver Island, though it has been reported from several localities in both Eastern and Western United States as well as from Europe.

The question of controlling this pest is thoroughly considered, and the authors state confidently that it can be readily held in check. Spraying is the only satisfactory method and may be applied twice or three times, according to the severity of the infestation, two sprayings in either case being made before blossoming, as treatment against the adults is more important than that directed against the larvæ. Miscible oil No. 2 in combination with nicotine sulphate gave best results for the first spray, while whale oil soap also with nicotine sulphate is most suitable and economical for the second and third sprays.

The bulletin is admirably illustrated with photographs and drawings by Dr. Cameron.

Life-history of the Leaf-eating Crane-fly, Cylindrotoma splendens Doane. By Alfred E. Cameron, M.A., D. Sc., F.E.S., Ann. Ent. Soc. Am., XI, No. 1, 1918, pp. 67-87, 18 figs.

This is an important contribution to the biology of crane-flies, as the species described is a member of a particularly interesting and isolated tribe of Tipulidæ, the Cylindrotomini, the known larvæ of which live exposed upon the leaves of various terrestrial and aquatic plants, instead of living in the mud of streams or in rotten wood as is the case with most of the family.

The discovery by Dr. Cameron of the larvæ of this species feeding on the leaves of the false bugbane (*Trautvetteria grandis*) on Vancouver Island is the first finding of the immature stages of *Cylindrotoma* in America, the only other nearctic species of the tribe, whose larva is known, being *Liogma nodicornis*. The other four species with known larvæ are all palæarctic and belong to as many genera, one of which is also a *Cylindrotoma*.

The writer succeeded in obtaining eggs from reared parents which mated in the rearing cages, and from these larvæ were obtained and successfully brought to maturity. More than 100 adults in all were reared.

In addition to careful observations on the behaviour in copulation, mechanism of oviposition, duration of immature stages, larval habits, etc., detailed descriptions are given of the larva and pupa, containing valuable information on the minute structures of the larval mouth capsule and other structural features. The figures illustrating these features are the work of the author and are admirable.

(To be continued.)

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The 55th Annual Meeting of the Society will be held at the Ontario Agricultural College, Guelph, Ontario, on Wednesday and Thursday, November 6th and 7th, 1918.

Members intending to present papers are requested to send in to the Secretary the titles (stating length of time required for reading and whether a lantern is desired) as soon as possible, in order that the programmes may be issued a week or more before the meeting. It is requested that papers do not exceed a twenty-minute time limit.

Accommodation for visitors can be secured in the men's residence at the College. Those intending to be present should send in their names to the Secretary on or before November 1st.

The Plant Pathologists of Canada have arranged to hold their Convention at the same place on Friday and Saturday, November 8th and 9th, immediately following the Entomological Society meeting.

L. CAESAR, PRESIDENT,
O. A. College,
Guelph, Ont.

A. W. BAKER, SECRETARY,
O. A. College,
Guelph, Ont.

October, 1918

Mailed October 10th, 1918

